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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*)�.
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[Document Name] Abstract

[Abstract]

[Objects of the Invention] Offer of the crank belt pulley which can control generating of noise.

[Elements of the Invention] It is the crank belt pulley 10 driven with a crankshaft 21. The crank belt pulley 10 has a boss 11, a rim 13, and an arm 12. The belt pulley cover 15 which is wearing the lateral surface of the crank belt pulley 10 is attached to the convex surface 132 of a rim 13. Inside a crankshaft 21, the resonator room 23 is established and the resonator room 23 is open for free passage with the wall space 18 in a belt pulley through the free passage way 17. You may form several free passage ways 17 where the free passage way 17 can be established in the set bolt 14, and paths differ. It is desirable to form the buffer member 19 in the belt pulley cover 15.

[A selection figure] drawing 1

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[Translation done.]

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[Document Name] Description

[Title of the Invention] Crank belt pulley

[Claim(s)]

[Claim 1] With an engine crankshaft, are the crank belt pulley to drive and [ this crank belt pulley ] Have the arm which connects the boss connected with the above-mentioned crankshaft in the shape of the same axle, the rim which equips the perimeter with a belt, and the above-mentioned boss and a rim, and [ the above-mentioned rim ] While having the convex surface which projects in the method of outside [ arm / the above-mentioned boss and ] at the opposite side of a crankshaft The belt pulley cover which is wearing the lateral surface of a crank belt pulley is attached to this convex surface, and, on the other hand, inside a crankshaft It is the crank belt pulley which the resonator room for silence is established and is characterized by connecting this resonator room with the wall space in a belt pulley formed through a free passage way of the internal surface of the above-mentioned belt pulley cover, and the lateral surface of a crank belt pulley.

[Claim 2] The crank belt pulley characterized by making a buffer member have interposed between the above-mentioned belt pulley cover and the convex surface of a rim in Claim 1.

[Claim 3] The free passage way which connects the above-mentioned resonator room and the wall space in a belt pulley in Claim 1 or Claim 2 is a crank belt pulley characterized by consisting of several free passage ways where paths differ.

[Claim 4] It is the crank belt pulley which the above-mentioned boss is connected with the crankshaft with the set bolt screwed on the axial center part of a crankshaft in Claim 1, Claim 2, or Claim 3, and is characterized by drilling the above-mentioned free passage way in the inside of the above-mentioned set bolt on the other hand.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the crank belt pulley connected with an engine crankshaft, and relates to the crank belt pulley of low noise especially.

[0002]

[Description of the Prior Art] There is much what an internal-combustion engine fixes a crank belt pulley to the end of the crankshaft projected out of the crank case, and drives a cooling fan, a dynamo, etc. through V belt by using this crank belt pulley as a driving pulley. The crank belt pulley 90 is being fixed to the end of the crankshaft 92 which projects from the gear cover 91 of a crank case with the set bolt 93, as shown in drawing 3.

[0003] That is, it is established at the end of a crankshaft 92, accumulate, the set bolt 93 is made to screw on the screw hole 921, and the crank belt pulley 90 is fixed to a crankshaft 92. The crank belt pulley 90 has the boss 94 who constitutes an axial center part, the rim 95 equipped with a belt, and the arm 96 which connects both 94 and 95, as shown in drawing 4.

[0004] Since the peripheral face 951 is equipped with a belt as shown in drawing 3, the rim 95 has the structure projected to the method of outside (a crankshaft 92 side, opposite side) to the arm 96 or the boss 94. That is, the lateral surface of a rim 95 forms the convex surface 952 which projected to the method of outside [ lateral surface / 941,961 / of a boss 94 or an arm 96 ]. In addition, in drawing 3 and drawing 4, a mark 97 is an oil seal member and a mark 98 is a washer.

[0005]

[Problem(s) to be Solved] However, there are the following problems in the conventional crank belt pulley. That is, from the surface, I hear that the noise emitted from a crank belt pulley among the noise emitted is very loud, and there is outside an engine.

[0006] [ the thing which such noise is told to the crank belt pulley 90 from the crankshaft 92 shown in drawing 3, and is emitted from the arm 96 and rim 95 of the crank belt pulley 90, and the noise emitted from the gear cover 91 / the window 961 (\*\*\*\*\*\*) formed between the arms 96 shown in drawing 4 ] The weight to occupy is large, although it passes and is emitted. This invention tends to offer the crank belt pulley which can control generating of noise sharply in view of this conventional problem.

[0007]

[Means for Solving the Problem] With an engine crankshaft, this invention is a crank belt pulley to drive, and [ this crank belt pulley ] Have the arm which connects the boss connected with the above-mentioned crankshaft in the shape of the same axle, the rim which equips the perimeter with a belt, and the above-mentioned boss and a rim, and [ the above-mentioned rim ] While having the convex surface which projects in the method of outside [ arm / the above-mentioned boss and ] at the opposite side of a crankshaft The belt pulley cover which is wearing the lateral surface of a crank belt pulley is attached to this convex surface, and, on the other hand, inside a crankshaft The resonator room for silence is established and this resonator room is in the crank belt pulley characterized by connecting with the wall space in a belt pulley formed of the internal surface of the above-mentioned belt pulley cover, and the

lateral surface of a crank belt pulley through a free passage way.

[0008] The 1st point of what should be most observed in this invention is having attached the belt pulley cover which is wearing the lateral surface of a crank belt pulley to the convex surface of a rim. As mentioned above, the lateral surface of the rim has the convex surface (refer to drawing 3 and a mark 952) which projected to the method of outside [ lateral surface / of a boss or an arm ], can attach a belt pulley cover here and can be wearing the lateral surface of a crank belt pulley.

[0009] As a result, the wall space in a belt pulley will be formed in a crank belt pulley inner side according to the internal surface of the above-mentioned belt pulley cover, and the lateral surface of a crank belt pulley. In addition, between the above-mentioned belt pulley cover and the convex surface of a rim, a thing [ making a buffer member establish like ] according to claim 2 is desirable.

[0010] It is because the noise which vibration of a belt pulley cover is controlled and is emitted from a belt pulley cover since floating of the whole belt pulley cover is attained by the above-mentioned buffer member decreases. That is, when a belt pulley cover is fixed to the convex surface of a rim rigid, many of sound pressure applied to the belt pulley cover changes to the oscillating sound of a belt pulley cover, but when the whole belt pulley cover floats, pronunciation vibration of a belt pulley cover is controlled sharply. In addition, the belt pulley cover itself can also be formed by the strong member of buffer nature.

[0011] The 2nd point of what should be most observed in this invention is having established the resonator room for silence to the inside of a crankshaft, and having connected this resonator room and the above-mentioned wall space in a belt pulley with it by the free passage way. That is, the resonator room is released through the above-mentioned free passage way in the wall space in a belt pulley.

[0012] Various kinds of form, such as a cylindrical shape, a cone, and multiple pillar type, is one of the form of a resonator room. Moreover, as for a free passage way, it is desirable to prepare several free passage ways according to claim 3 where paths (cross-section area)

differ like. It is because the compass (frequency band) muffled by preparing two or more free passage ways since the resonant frequency of the sound muffled in a resonator room changes will be sharply extended if the path of a free passage way is changeable so that details may be mentioned later.

[0013] Moreover, when a crank belt pulley is attached to a crankshaft with the above set bolts, it is suitable if a free passage way is established in the inside of a set bolt like the Claim 4 description. It is because it is comparatively easy to establish a free passage way inside a set bolt at the male screw circles of a set bolt compared with establishing a free passage way to the boss itself.

[0014]

[Function and Effect] The 1st point of the effect in the crank belt pulley of this invention is because the belt pulley cover which is wearing the lateral surface of a crank belt pulley was prepared. That is, although the noise emitted from the gear cover which is one of the sources of noise was conventionally emitted to the method of outside from the window between the arms of a crank belt pulley (drawing 3, drawing 4 mark 961), it can control generating of noise by intercepting this by a belt pulley cover.

[0015] The 2nd point of the effect of this invention is because the resonator room and the free passage way were prepared. The noise which was transmitted to the crank belt pulley from the crankshaft by this, and was emitted from the crank belt pulley can be sharply attenuated in the resonance machine which consists of the above-mentioned resonator room and a free passage way.

[0016] That is, it is because the progressive wave which goes to the method of outside from a resonator room, and the reflective wave reflected from a free passage way interfere mutually and reduces the energy of sound. When the length (distance of a resonator room and the wall space in a belt pulley) of a free passage way is set to L, capacity of r and a resonator room is set to V for a radius and acoustic velocity is set to C, it is known that the center frequency (resonant frequency) f of the compass muffled is shown by the following formula.  $f=C/2\pi r [pir^2-L]$

(L+0.8r)1V-1] One half ..... (1)

[0017] The above-mentioned frequency f can be set as the audio frequency of the high energy in the frequency spectrum of generating noise, and generating noise can be reduced sharply. Moreover, if several free passage ways according to claim 3 where Paths r differ as a free passage way like are prepared, the above-mentioned resonant frequency f turns into plurality, and the compass which can be muffled can be distributed and extended to a wide area.

[0018] Moreover, since the noise emitted outside from the free passage way is intercepted by said belt pulley cover, the noise emitted outside falls further by this. The crank belt pulley of this invention can reduce both the noise emitted from a gear cover, and the noise transmitted from a crankshaft as mentioned above. Thus, according to this invention, the crank belt pulley which can control generating of noise sharply can be offered.

[0019]

[Working example] The work example of this invention is explained using drawing 1 and drawing 2. This example is the crank belt pulley 10 driven with the engine crankshaft 21, as shown in drawing 1. The crank belt pulley 10 has the arm 12 which connects the boss 11 connected with the crankshaft 21 in the shape of the same axle, the rim 13 which equips the perimeter 131 with a belt, and a boss 11 and a rim 13.

[0020] A rim 13 has the convex surface 132 which projects at the opposite side of a crankshaft 21 in the method of outside [ arm / 12 / the above-mentioned boss 11 and ]. And the belt pulley cover 15 which is wearing the lateral surface of the crank belt pulley 10 is attached to the convex surface 132. On the other hand inside the crankshaft 21, the resonator room 23 for silence is established. The resonator room 23 is connected with the wall space 18 in a belt pulley formed of the internal surface 151 of the belt pulley cover 15, and the lateral surface of the crank belt pulley 10 through the free passage way 17.

[0021] Moreover, the rubber cushion as a buffer member 19 is made to have interposed

between the belt pulley cover 15 and the convex surface 132 of a rim 13. And the boss 11 of the crank belt pulley 10 is connected with the crankshaft 21 with the set bolt 14 screwed on the axial center part of a crankshaft 21, and the free passage way 17 is drilled in the central part of the set bolt 14.

[0022] It explains in full detail about each below. As shown in drawing 1, the crankshaft 21 is making the outer edge part 211 project to a way outside the gear cover 25, and has attached the crank belt pulley 10 to the above-mentioned outer edge part 211. That is, from an inner direction, the boss 11 of the crank belt pulley 10 is attached in the perimeter of the outer edge part 211 which shortened the path a little, and a boss 11 is fixed with the set bolt 14.

[0023] moreover -- the cylindrical hollow part is established by the axial center part of the above-mentioned outer edge part 211 -- the method side of the outside -- the set bolt 14 -- screwing -- dried cuttlefish -- the screw part 212 is formed. Axial merit L0 of the above-mentioned hollow part It is 35mm and a diameter D is about 14mm. Moreover, full length L1 containing the head of the set bolt 14 screwed on the above-mentioned screw part 212 Insertion length L2 of the set bolt 14 which is about 40mm and is inserted in \*\*\*\*\* 212 It is about 20mm.

[0024] So, when the set bolt 14 is screwed on a crankshaft 21, a diameter D and the resonator room 23 of axial length (L0-L2) are formed in the above-mentioned hollow part. moreover, the free passage hole 17 the radius r of whose is about 5mm at the axial center part of the set bolt 14 -- drilling -- now, it is. In drawing 1, a mark 16 is a washer interposed between the set bolt 14 and a boss 11.

[0025] Moreover, between the gear cover 25 and the boss 11, the seal member 26 which carries out the seal of the oil is interposed. On the other hand, a rim 13 has the belt slot 133 on the perimeter 131, and has stuck the belt pulley cover 15 on the convex surface 132 through the buffer member 19. Moreover, between arms 12, the window 121 of \*\*\*\*\* is carrying out the opening.

[0026] Next, the operation effect of this example is described. When a crankshaft 21 is

equipped with the crank belt pulley 10 with the set bolt 14, the resonator room 23 is formed in the inside of a crankshaft 21 as mentioned above. And the resonator room 23 is open for free passage to the wall space 18 in a belt pulley through the free passage way 17 drilled by the set bolt 14.

[0027] As a result, the above-mentioned resonator room 23 and the free passage way 17 constitute the resonance machine which has the resonant frequency shown by the aforementioned (1) formula. The resonant frequency  $f$  which substituted the above-mentioned size many origin of the resonator room 23 and the free passage way 17 for (1) type is 1500 cycles. Since the above-mentioned resonant frequency  $f$  is equivalent to the high energy frequency in the noise spectrum emitted from a crankshaft 21, it can reduce sharply the noise emitted from a crankshaft 21 by operation of the above-mentioned resonance machine.

[0028] On the other hand, the belt pulley cover 15 is stuck on the convex surface 132 of the rim 11 of the crank belt pulley 10. As a result, the noise which is emitted from the gear cover 25 and advances through the window 121 between arms 12 is interrupted by the above-mentioned belt pulley cover 15, and is decreased.

[0029] Moreover, the noise which was not muffled with the above-mentioned resonance machine, but was emitted toward the method of outside is also interrupted by the above-mentioned belt pulley cover 15, and decreases sharply. As mentioned above, according to this example, the crank belt pulley which can control generating of noise sharply can be offered.

#### [Brief Description of the Drawings]

[Drawing 1] The sectional view at the time of installation of the crank belt pulley of a work example (A-A arrow look sectional view of drawing 2).

[Drawing 2] The side view except the belt pulley cover of the crank belt pulley of a work example.

[Drawing 3] The sectional view at the time of installation of the conventional crank belt pulley (B-B arrow look sectional view of drawing 4).

[Drawing 4] The side view of the conventional crank belt pulley.

[Explanations of letters or numerals] 10 ... a crank belt pulley and 11 ... a boss and 12 ... an arm and 13 ... a rim and 132 ... a convex surface and 14 ... a set bolt and 15 ... a belt pulley cover and 17 ... a free passage way and 18 ... the wall space in a belt pulley, and 19 ... a buffer member and 21 ... a crankshaft -- 23 ... a resonator room,

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[Translation done.]